# Professor Pierre Vogel

## A Tribute

**Dedicated to Professor Pierre Vogel on the occasion of his 70th birthday**

Pierre Vogel was born in Cully, VD (Switzerland) on the 23rd of October 1944. After high-school graduation in Lausanne, he enrolled in Chemical Engineering at the EPUL (actual EPFL) Lausanne in 1962. He obtained his diploma in 1966. Between 1966 and 1969, he worked in the group of Professor Horst Prinzbach toward his PhD degree on "Oxépines à partir des oxaquadricyclanes". He achieved his Ph.D. in an extremely short time and received the University award for the best Ph.D. thesis. He then moved as post-doctoral fellow to Yale University, where he joined the group of Professor Martin Saunders from 1969 until 1971. He worked on one of the most exciting problems at that time: the analysis and characterization by NMR methods of carbocation rearrangements. A series of highly visible publications resulted from the collaboration with Professors Martin Saunders, Jerome A. Berson, Kenneth A. Wiberg and Paul von Ragué Schleyer. Between 1971 and 1972 he joined the group of Professor Pierre Crabbé, at that time General Manager of the research division of Syntex S.A. in Mexico City. Pierre Vogel returned to the Institute of Organic Chemistry in Lausanne in 1972, where he quickly rose through the ranks: first as Maître-Assistant until 1973, then promoted to Assistant Professor and from 1977 to a Full Professor position at the University of Lausanne. For 10 years between 1991 and 2001 he was Vice-Chairman of the Institute of Organic Chemistry. In 2001, when the Institute of Organic Chemistry and the Institute of Inorganic Chemistry joined the EPFL, Pierre Vogel became Professor of Organic Chemistry at the Swiss Federal Institute of Technology in Lausanne. He was the Director of the doctoral program in chemistry and chemical engineering of the EPFL from 2003 until his retirement from this school in 2010. He is now participating in the European "PANACREAS" project (FP7 Health program) on pancreatic cancer.

Pierre Vogel has invested time and effort into strengthening organic synthetic chemistry keeping a strong interest in the study of reaction mechanisms. He was a member of the Swiss



 

National Council of Research between 1989 and 2000 and launched the program Chiral2 which initiated a considerable push for research on enantioselective synthesis and catalysis. He was the Swiss coordinator of the European COST D2 program between 1993 and 1997 and assumed the presidency of the European management committee of this program in 1997. In 1999 he took over responsibility as coordinator of the European COST D13 group on "Oligosaccharide Mimetics: New Molecular Tools for Biology and Medicine".

Pierre Vogel is devoted to his Alma Mater. Deeply attached to the Lausanne region and its vineyards, he has been extremely loyal to the scientists and colleagues working in Lausanne and especially to former co-workers. His profound interest in the quality of teaching is demonstrated by his implication in the DEA multinational de Chimie Moléculaire at the Ecole Polytechnique in Palaiseau which became the first European master program in chemistry. A visible sign of his efforts for education are his text books, which are a treasure trove of knowledge on mechanisms and transformations: in 1979 *"*La réactivité chimique : faits et modèles*"* (*The chemical reactivity: facts and models* ), in 1985 *"Carbocation chemistry"* and his last book published in 1998 *"*Chimie organique : méthodes et modèles*"* (*Organic chemistry: methods and models* ). His qualities as a teacher were combined with a relentless zeal for his research projects.

The scientific career of Pierre Vogel started with a strong focus on physical organic chemistry. His approach was to construct new bicyclic compounds allowing him to study the interactions between non-conjugated functions with the goal of understanding how organic and organometallic functions communicate in the ground state or under the stress of a reaction. This led him to discover that a carbonyl group homoconjugated with a π-system can be electron-releasing. With the 2,3,5,6-tetramethylidene-7-oxanorbornanes he developed many years before combinatorial chemistry became popular, a combinatorial synthesis of polycyclic compounds including the anti-cancer anthracyclines. He prepared the first examples of the [l.m.n]hericenes and found the first example of an intramolecular thermoneutral dyotropic transfer of dihydrogen between an alkane and an alkene moiety. He also demonstrated experimentally that norbornenes have non-planar alkene moieties as predicted by Fukui. According to him, these properties are associated with the ground state properties of norbornene that reflect??? the character of its products of cycloreversion: cyclopentadiene and ethylene. The overeaching concept of Pierre Vogel's research has been the *stereoselective synthesis of chiral bioactive* compounds such as the furans and tartaric acids using starting materials readily available from biomass. He concentrated on the challenging synthesis of glycomimetics (azasugars, carbasugars, C-glycosides, imino-C-disaccharides) as new tools for biology and medicine. This culminated in the preparation of anti-genes containing glycopeptides made of C-linked disaccharides and for which strong immune response in mice has been demonstrated. This opens a new avenue for the immunotherapy of cancers and other diseases. Developing the synthesis of new scaffolds for biomolecules using polyfunctional systems for combinatorial chemistry and multicomponent synthesis is an important contribution of Pierre's group. With the discovery that simple dienes add to sulfur dioxide in the Diels-Alder mode at low temperature a new asymmetric C-C bond

 

forming reaction was developed and applied to the short, convergent, asymmetric synthesis of polyketide and polypropionate antibiotics.

The stereoelectronic control imposed by bicyclic skeletons such as 7-oxanorborn-5-en-2-yl ("naked sugars"), 7-azanorbornenyl ("aza-naked sugars") and 8-oxabicyclo[3.2.1]oct-6-enyl derivatives was cleverly applied to synthesize many natural products stereoselectively and efficiently. The wealth of partial and total synthesis of natural products derived from these seemingly simple starting materials is really astounding: Nonactin, Rifamycin S, (-)-Dolabriferol, Squalestatins, (-)-Conduramine C-1, (-)-Conduramine B-1, (+)-Castanospermine, (+)-Lentiginosine, Epibatidine, Altohyrtin A, (-)-Conduritol C, Cyclophellitol, L-Daunosamine, Daunomycinone, (-)-1-Deoxynojirimycin, 1-Deoxymannojirimycin, Allonojirimycin, Deoxypolyoxin-C, D-Lividosamine. In all projects Pierre Vogel embarked on, the application of new chemistry was at the center of his interest. The research covers a wide range of chemical reactivity and chemical structures.

The quality of the scientific results of Pierre Vogel's group is largely due to the positive attitude and the strong commitment of his excellent co-workers. His enthusiasm and his intense dedication for science were a source of inspiration to them. He liked, and he still enjoys, intensive discussions with his colleagues and offering advice to his co-workers. It is therefore no surprise that he has been able to attract many highly gifted and motivated students to join his group. A total of 78 Ph.D. students and 44 postdocs have worked under his supervision. Many of his students and Postdocs became professor, either in Switzerland (P.-A. Carrupt and J.-L. Reymond) or abroad (J. Tamariz, Mexico; L. Schwager, Ecuator; K. A. Black, USA; S. Araki, Japan; C. Le Drian, B. Deguin, F. Popowicz, France, M. Bimwaka, Zaire; A. Szaki, A.J. Moreno-Vargas, A. T. Carmona Asenjo, Spain; C. Nativi, F. Cardona, Italy; G. R. Jones, UK; M. Turks, Latvia; L. Awad, Saudi Arabia). From the start of his career Pierre Vogel collaborated with colleagues in his own institutions (UNIL, EPFL), in Switzerland, and also worldwide. He combined his knowledge and enthusiasm for chemistry with his conviction that all tools available have to be used to solve challenging problems. His collaborations ranged from theoretical chemistry, physical chemistry, organometallic chemistry, catalysis and spectroscopy to pure synthetic chemistry and medicinal chemistry.

The Vogel lab published more than 525 original papers in peer reviewed journals and participated in 8 patents. Since the beginning of his career, Pierre Vogel has kept up an impressive output. Applying all criteria that have become so popular these days, he contributed considerably to the reputation of the University of Lausanne and of the EPFL. Many of his contributions are highly cited. He has made an impact in carbohydrate chemistry with his "naked sugars": enantiomerically enriched bicyclic systems with three carbon centers that can be substituted readily regio- and stereoselectively, and then converted into sugars and analogs. Professor Pierre Vogel has been invited lecturer in numerous international conferences and symposia. He has given lectures on his research at Universities and academic institutions on all continents except Antarctica. He served as member of the editorial boards of a number of journals, including *Helvetica Chimica Acta, Chimia, Carbohydrate Letters, Current Organic*

 

*Synthesis, Letters in Organic Chemistry, Mini-reviews in Organic Chemistry* and *J. Carbohydrate Chemistry*.

Professor Pierre Vogel has been honored for his fundamental contributions to mechanistic and synthetic chemistry. In 1976, he received the Alfred-Werner Medal of the Swiss Chemical Society. He was Associate Professor at the École Normale Supérieure, Paris, 1988-1989, at the Université de Montpellier, 1992-1993, at the Université Paris-Sud, Orsay, 1993 and at ESPCI, Paris 1994. He was Pacific Coast Lecturer in 1992 and taught for several years at the Ecole Polytechnique in Palaiseau, France. He gave advanced courses in several universities of Spain. He was awarded with the Novartis Lectureship 2002-2003 and he was nominated Boehringer Ingelheim Distinguished Lecturer for 2004-2005. From 1989 until 2000 he served as Member of the Research Council of the Swiss National Science Foundation. He also has been a Member of the "Conseil Scientifique du Département des Sciences Chimiques" of the CNRS, France .

This commemorative issue features the contributions of many friends and former co-workers of Pierre Vogel. It gives testimony of the respect and friendship that we all have for Pierre and his lasting commitment to chemistry.

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## Selected Papers

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